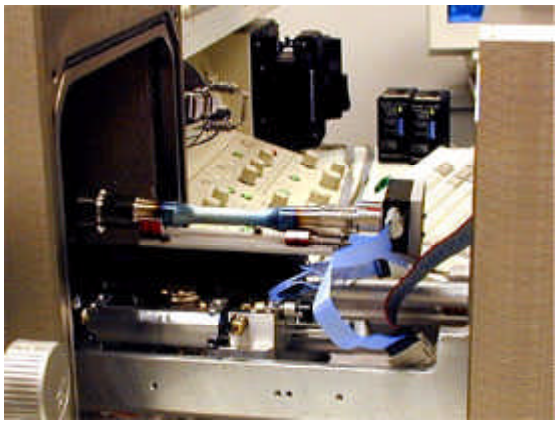
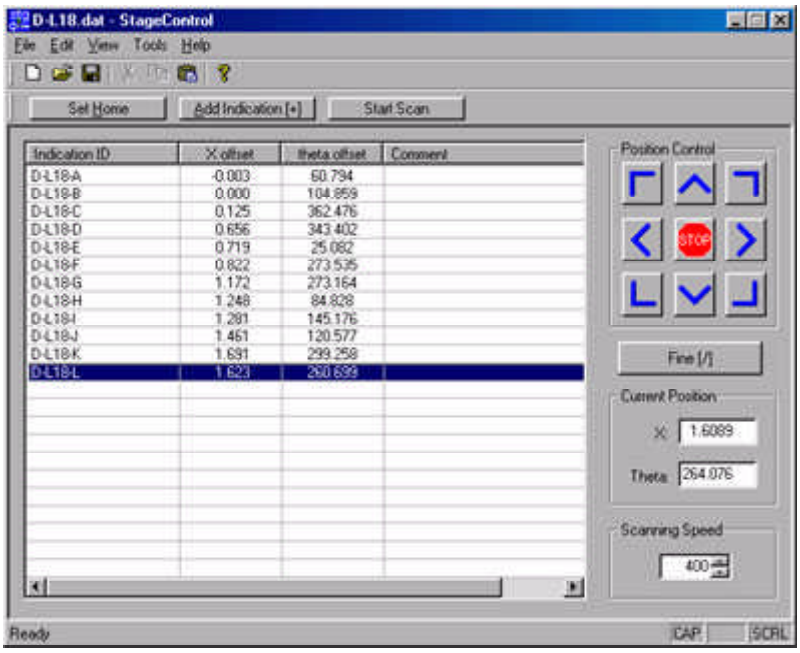
Scanning Electron Microscope Mapping System Developed for Detecting Surface Defects in Fatigue Specimens

An automated two-degree-of-freedom specimen positioning stage has been developed at the NASA Glenn Research Center to map and monitor defects in fatigue specimens. This system expedites the examination of the entire gauge section of fatigue specimens so that defects can be found using scanning electron microscopy (SEM). Translation and rotation stages are driven by microprocessor-based controllers that are, in turn, interfaced to a computer running custom-designed software. This system is currently being used to find and record the location of ceramic inclusions in powder metallurgy materials. The mapped inclusions are periodically examined during interrupted fatigue experiments. The number of cycles to initiate cracks from these inclusions and the rate of growth of initiated cracks can then be quantified. This information is necessary to quantify the effect of this type of defect on the durability of powder metallurgy materials. This system was developed with support of the Ultra Safe program.



Fatigue specimen mounted on translation-rotation stage.



User interface for StageControl software.

Example of an inclusion found with positioning system.

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